

Application No. 10/790,849
Amendment dated March 27, 2006
Reply to Office Action of October 27, 2005

Docket No.: K2020.0003/P003

AMENDMENTS TO THE CLAIMS

1. (Currently Amended) A particle beam therapy system comprising:
 - a charged particle beam generator for emitting a charged particle beam;
 - a plurality of treatment rooms in each of which an irradiation unit for irradiating the charged particle beam is disposed;
 - a plurality of beam transport systems communicated with said charged particle beam generator and transporting the charged particle beam emitted from said charged particle beam generator separately to said respective irradiation units in said plurality of treatment rooms; and
 - a first shutter provided in at least one of said beam transport systems and shutting off a beam path in the relevant beam transport system, said first shutter being a shutter for physically blocking the beam itself.

2. (Currently Amended) A particle beam therapy system comprising:
 - a charged particle beam generator for emitting a charged particle beam;
 - a plurality of treatment rooms in each of which an irradiation unit for irradiating the charged particle beam is disposed;
 - a first beam transport system connected to said charged particle beam generator and transporting the charged particle beam emitted from said charged particle beam generator;
 - a plurality of second beam transport systems provided respectively corresponding to said treatment rooms, connected to said first beam transport system, and transporting the charged particle beam transported through said first beam transport system to the corresponding irradiation units mounted to rotating gantries disposed in said treatment rooms;

Application No. 10/790,849
Amendment dated March 27, 2006
Reply to Office Action of October 27, 2005

Docket No.: K2020.0003/P003

a path switching device disposed at each of junctions between a beam path in said first beam transport system and beam paths in said plurality of second beam transport systems, and switching the beam path in which the charged particle beam is introduced; and

a plurality of first shutters provided respectively in said plurality of second beam transport systems downstream of said path switching devices in the direction of advance of the charged particle beam, and shutting off the beam path in the corresponding second beam transport system, said first shutters each being a shutter for physically blocking the beam itself.

3. (Original) A particle beam therapy system according to Claim 2, further comprising a shutter controller for controlling said first shutter to be open, which is provided in the second beam transport system introducing the charged particle beam to selected one of said plurality of treatment rooms.

4. (Original) A particle beam therapy system according to Claim 3, wherein said shutter controller does not control said first shutter to be open, which is provided in each of the other second beam transport systems not introducing the charged particle beam than the second beam transport system introducing the charged particle beam to the selected treatment room.

5. (Original) A particle beam therapy system according to Claim 3, further comprising a selected-treatment-room information output device for outputting selected-treatment-room information representing the selected treatment room to said shutter controller.

Application No. 10/790,849
Amendment dated March 27, 2006
Reply to Office Action of October 27, 2005

Docket No.: K2020.0003/P003

6. (Original) A particle beam therapy system according to Claim 5, wherein said shutter controller executes first control for bringing all said first shutters provided in all said second beam transport systems into a closed state, and second control for bringing the first shutter into an open state, which is provided in the second beam transport system introducing the charged particle beam to the selected treatment room, by using said selected-treatment-room information.

7. (Original) A particle beam therapy system according to Claim 3, wherein said shutter controller executes first control for bringing all said first shutters provided in all said second beam transport systems into a closed state, and second control for bringing the first shutter into an open state, which is provided in the second beam transport system introducing the charged particle beam to the selected treatment room.

8. (Currently Amended) A particle beam therapy system according to ~~Claim 3, comprising:~~
a charged particle beam generator for emitting a charged particle beam;
a plurality of treatment rooms in each of which an irradiation unit for irradiating the charged particle beam is disposed;
a first beam transport system connected to said charged particle beam generator and transporting the charged particle beam emitted from said charged particle beam generator;
a plurality of second beam transport systems provided respectively corresponding to said treatment rooms, connected to said first beam transport system, and transporting the charged particle beam transported through said first beam

Application No. 10/790,849
Amendment dated March 27, 2006
Reply to Office Action of October 27, 2005

Docket No.: K2020.0003/P003

transport system to the corresponding irradiation units mounted to rotating gantries disposed in said treatment rooms;

a path switching device disposed at each of junctions between a beam path in said first beam transport system and beam paths in said plurality of second beam transport systems, and switching the beam path in which the charged particle beam is introduced;

a plurality of first shutters provided respectively in said plurality of second beam transport systems downstream of said path switching devices in the direction of advance of the charged particle beam, and shutting off the beam path in the corresponding second beam transport system; and

a shutter controller for controlling said first shutter to be open, which is provided in the second beam transport system introducing the charged particle beam to selected one of said plurality of treatment rooms;

wherein said irradiation units disposed in said plurality of treatment rooms are each provided with a dose detector for detecting radiation dose produced by the charged particle beam, and said shutter controller controls the open first shutter into a closed state when the radiation dose detected by the dose detector provided in the selected treatment room reaches a dose setting value.

9. (Original) A particle beam therapy system according to Claim 3, wherein said shutter controller controls the open first shutter into a closed state when irradiation of the charged particle beam by said irradiation unit disposed in the selected treatment room is completed.

Application No. 10/790,849
Amendment dated March 27, 2006
Reply to Office Action of October 27, 2005

Docket No.: K2020.0003/P003

10. (Original) A particle beam therapy system according to Claim 2, further comprising a second shutter which is provided in said first beam transport system at a position between said charged particle beam generator and the beam transport system junction closest to said charged particle beam generator, and which shuts off the beam path in said first beam transport system.

11. (Currently Amended) A particle beam therapy system according to Claim 10, comprising:

a charged particle beam generator for emitting a charged particle beam;

a plurality of treatment rooms in each of which an irradiation unit for irradiating the charged particle beam is disposed;

a first beam transport system connected to said charged particle beam generator and transporting the charged particle beam emitted from said charged particle beam generator;

a plurality of second beam transport systems provided respectively corresponding to said treatment rooms, connected to said first beam transport system, and transporting the charged particle beam transported through said first beam transport system to the corresponding irradiation units mounted to rotating gantries disposed in said treatment rooms;

a path switching device disposed at each of junctions between a beam path in said first beam transport system and beam paths in said plurality of second beam transport systems, and switching the beam path in which the charged particle beam is introduced;

a plurality of first shutters provided respectively in said plurality of second beam transport systems downstream of said path switching devices in the direction of

Application No. 10/790,849
Amendment dated March 27, 2006
Reply to Office Action of October 27, 2005

Docket No.: K2020.0003/P003

advance of the charged particle beam, and shutting off the beam path in the
corresponding second beam transport system; and

a second shutter which is provided in said first beam transport system at a
position between said charged particle beam generator and the beam transport system
junction closest to said charged particle beam generator, and which shuts off the beam
path in said first beam transport system;

wherein said second shutter is lighter than said first shutter.

12. (Original) A particle beam therapy system according to Claim 10, further comprising a shutter controller for controlling the first shutter into an open state, which is provided in the second beam transport system introducing the charged particle beam to the selected treatment room, and thereafter controlling said second shutter into an open state.

13. (Original) A particle beam therapy system according to Claim 10, further comprising a shutter controller for controlling the first shutter into an open state, which is provided in the second beam transport system introducing the charged particle beam to selected one of said plurality of treatment rooms, and thereafter controlling said second shutter into an open state.

14. (Original) A particle beam therapy system according to Claim 2, wherein said path switching device is a switching electromagnet.

15. (Currently Amended) A particle beam irradiating method comprising the steps of:

Application No. 10/790,849

Docket No.: K2020.0003/P003

Amendment dated March 27, 2006

Reply to Office Action of October 27, 2005

providing a shutter in a beam path for introducing a charged particle beam to an irradiation unit in a selected one of a plurality of treatment rooms, said shutter being a shutter for physically blocking the beam itself;

opening said shutter when transporting a charged particle beam emitted from a charged particle beam generator to ~~the an~~ irradiation unit in said selected one of a plurality of treatment ~~room~~ rooms, ~~opening a shutter provided in a beam path for introducing the charged particle beam to said irradiation unit in the selected treatment room,~~ thereby transporting the charged particle beam; and

irradiating the charged particle beam having reached said irradiation unit in the selected treatment room to a patient present in the selected treatment room.

16. (Original) A particle beam irradiating method according to Claim 15, wherein the irradiation of the charged particle beam to said patient is performed in a state in which shutters provided in the beam paths extended into the other treatment rooms than the selected treatment room are closed.

17. (Currently Amended) A particle beam therapy system comprising:
a charged particle beam generator for emitting a charged particle beam;
a plurality of irradiation units disposed in a plurality of treatment rooms,
respectively, in each of which an irradiation unit for irradiating the charged particle beam ~~is disposed;~~

a charged particle beam transport apparatus having a plurality of beam paths, communicated with said charged particle beam generator, and transporting the charged particle beam emitted from said charged particle beam generator separately to said respective irradiation units in said plurality of treatment rooms; ~~and~~
a plurality of element groups;

Application No. 10/790,849
Amendment dated March 27, 2006
Reply to Office Action of October 27, 2005

Docket No.: K2020.0003/P003

a plurality of shutters provided respectively in said plurality of beam paths for shutting off the respective beam paths;

said plurality of element groups being successively arranged in said beam paths in the direction in which the charged particle beam advances through said beam paths, and said element groups including respective elements disposed in said plurality of beam paths;

said element groups being each provided with an alternatively selecting device for alternatively selecting the respective elements in said element groups; and

a shutter controller for controlling said shutter to be open, which is provided in the beam path associated with the elements selected by said alternatively selecting device, while maintaining the other shutters to be closed, when it is confirmed that the operations of the elements selected by said alternatively selecting device are normal by comparing actual status data of the elements selected by said alternatively selecting device with control command data of said selected elements.

18. (Currently Amended) A particle beam therapy system comprising:
a charged particle beam generator for emitting a charged particle beam;
a plurality of irradiation units disposed in a plurality of treatment rooms,
respectively, in each of which an irradiation unit for irradiating the charged particle beam ~~is disposed;~~

a charged particle beam transport apparatus having a plurality of beam paths, communicated with said charged particle beam generator, and transporting the charged particle beam emitted from said charged particle beam generator separately to said respective irradiation units in said plurality of treatment rooms;

a plurality of element groups each having a plurality of elements; and

Application No. 10/790,849
Amendment dated March 27, 2006
Reply to Office Action of October 27, 2005

Docket No.: K2020.0003/P003

a plurality of shutters provided respectively in said plurality of beam paths for shutting off the respective beam paths;

said element groups being disposed in said plurality of beam paths in a one-to-one relation, and said plurality of elements in each of said element groups being successively arranged in the corresponding beam path in the direction of advance of the charged particle beam;

an alternatively selecting device for alternatively selecting any one of said element groups; and

a shutter controller for controlling said shutter to be open, which is provided in the beam path associated with the element group selected by said alternatively selecting device, while maintaining the other shutters to be closed, when it is confirmed that the operations of the element group selected by said alternatively selecting device are normal by comparing actual status data of the element group selected by said alternatively selecting device with control command data of said selected element group.

19. (Original) A particle beam therapy system according to Claim 17, wherein said alternatively selecting device connects the respective elements in said element groups to a common power supply in an alternative manner.

20. (Original) A particle beam therapy system according to Claim 18, wherein said alternatively selecting device connects the plurality of elements, which are electrically connected in series in each of said element groups, to a common power supply in an alternative manner.

Application No. 10/790,849
Amendment dated March 27, 2006
Reply to Office Action of October 27, 2005

Docket No.: K2020.0003/P003

21. (Original) A particle beam therapy system according to Claim 17, wherein said alternatively selecting device is a mechanical switch.

22. (Original) A particle beam therapy system according to Claim 18, wherein said alternatively selecting device is a mechanical switch.

23. (Original) A particle beam therapy system according to Claim 19, wherein said alternatively selecting device is a mechanical switch.

24. (Original) A particle beam therapy system according to Claim 19, wherein at least one of said element groups has the plurality of elements arranged along one of said beam paths and electrically connected in series.

25. (Original) A particle beam therapy system according to Claim 19, wherein said elements are electromagnets.

26. (Original) A particle beam therapy system according to Claim 19, wherein each element in one of said element groups is a path switching electromagnet for introducing the charged particle beam to corresponding each beam path.

27. (Currently Amended) A particle beam therapy system according to Claim 17 or 18 [[19]], wherein said shutter controller controls said shutter to be open, which is provided in the beam path associated with the elements or element group selected by said alternatively selecting device, while maintaining the other shutters to be closed, when it is confirmed that the operations of the element group selected by said alternatively selecting device are normal and further it is confirmed that a

Application No. 10/790,849
Amendment dated March 27, 2006
Reply to Office Action of October 27, 2005

Docket No.: K2020.0003/P003

treatment room number, which is the same as the treatment room number for the beam path associated with the elements or element group selected by said alternative selecting device, is received ~~each element in one of said element groups includes a shutter provided in corresponding each beam path and shutting off the beam path, and a shutter driver for independently driving the shutter.~~

28. (Currently Amended) A particle beam irradiating method comprising the steps of causing a plurality of patients to enter a plurality of treatment rooms, respectively, and selectively introducing a charged particle beam emitted from a charged particle beam generator to irradiation units disposed in said treatment rooms for irradiation to the patients in sequence, the irradiating method comprising the steps of:

disposing electromagnet groups ~~disposed~~ in a one-to-one relation to a plurality of beam transport paths extended from said charged particle beam generator to said irradiation units in said plurality of treatment rooms;

providing shutters in said plurality of beam transport paths, respectively, for shutting off the respective beam transport paths;

forming no beam transport paths and maintaining the associated shutters to be closed when electric power from a power supply is supplied to plural ones of said electromagnet groups; and

forming one corresponding beam transport path when electric power from said power supply is supplied to only one of said electromagnet groups, and controlling the associated shutter to be open ~~forming one corresponding beam transport path~~ and irradiating the charged particle beam to the patient by the irradiation unit in the corresponding treatment room through the formed beam transport path.

Application No. 10/790,849
Amendment dated March 27, 2006
Reply to Office Action of October 27, 2005

Docket No.: K2020.0003/P003

29. (New) A particle beam therapy system according to Claim 17 or 18, wherein said shutter is a shutter for physically blocking the beam itself.

30. (New) A particle beam irradiating method according to Claim 28, wherein each of said shutters is a shutter for physically blocking the beam itself.